

WELDING AND FABRICATION

EDUCATIONAL SPACES

Printing Instructions

1. Print the Table of Contents section to obtain an overview of the total document.
 2. Print each document section that you are interested in.
 3. For a *complete* document, please *print all* sections.
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WELDING AND FABRICATION

GENERAL PROGRAM GOALS AND OBJECTIVES

- ☐ Welding is a program designed to prepare students with skills for occupations in welding as form cutters, tack welders, welder assemblers, welder helpers, combination welders, arc welders and production line welders. The content includes use of blue prints and shop drawings; use of gases and/or welding processes; and brazing parts according to diagrams, blueprints, or written specification. Laboratory activities are an integral part of this program and provide instruction in various processes and techniques of welding and fabrication skills including oxyacetylene welding and cutting, brazing, arc welding, SMAW welding, GTAW welding, MIG welding, flux core arc welding, TIG welding, certification test preparation and use of current industry standards and techniques. The program also includes training in applied communications, and employability skills including leadership, human relations, and safe efficient work practices. Instruction at the secondary level requires a three year sequence of instruction with at least one multiple period block of instruction. All instructors must have the American Welding Society (AWS) Instructor or Inspector certification and have the option of having their program AWS certified as an inspection center.

PROGRAM ACTIVITIES

- ☐ Testing of Welds
- ☐ Punching
- ☐ Lecturing
- ☐ Demonstrations
- ☐ Grinding
- ☐ Sawing
- ☐ Fabrication
- ☐ Painting/Coating
- ☐ Bending
- ☐ Shearing
- ☐ Breaking
- ☐ Storing
- ☐ Welding
- ☐ Cutting

AREAS

DESCRIPTION	EST. STAFF	EST. STUDENTS	SQ. FT. TOTAL
Classroom	1-2	12-20	900
Storage/Tool Room			200-250
Lab	1-2	12-20	4000-7000
Paint Booth	1-2	2-4	350
Outside Storage Fuel and Materials (Secured)			10x10 spaces (2)
Office	1-2		150
Info Systems	1-2	2-4	100
Grinding	1-2	2-3	120
Locker			150

INTERNAL/EXTERNAL RELATIONSHIPS - WHAT SHOULD BE NEAR THIS AREA

- ☐ The office, lab and classroom need to be contiguous.
- ☐ The grinding area and fabrication area should be together.
- ☐ The lab and the storage area should be close together.
- ☐ A locker room, restroom area needs to be near the lab.

INTERNAL/EXTERNAL RELATIONSHIPS - WHAT SHOULD **NOT** BE NEAR THIS AREA

- ☐ This area should not be near any quiet study areas such as the media center or the core classrooms.
- ☐ The grinding area should be located away from the computer area.

UTILITIES

Plumbing:

- ☐ Compressed air is needed throughout the lab and classroom.
- ☐ Compressed air is also needed in the outside storage.
- ☐ Air lines need to be sized adequately.
- ☐ A manifold system is needed at each stall. (Fuel gas, oxygen, argon or CO₂).
- ☐ A locker clean up area with sinks and restrooms is needed.
- ☐ Wash area, and eye wash area is needed in the lab.
- ☐ Water is needed at the cooling tanks.
- ☐ The welding booth needs water.

HVAC

- ☐ Additional ventilation is needed at the following areas:
 - Each booth
 - Grinding Area
 - Each cutting area
- ☐ Consider a movable, overhead capture source in the fabrication area.
- ☐ The heating, ventilation, and air-conditioning system needs to be of sufficient size to keep each instructional space at a comfortable temperature.
- ☐ The system needs to have a fresh air exchange system to keep high air quality in each instructional space.
- ☐ The classroom supply and exhaust ducts need to be positioned to minimize any draftiness in the room.
- ☐ The HVAC controls need to be designed to allow individuals the ability to

modify the classroom temperature for the instructional requirements of the classroom activities.

- ☐ The controls need to be positioned so that the room temperature is not “misread” (e.g., not too close to a door, window, or vent).

Electrical:

- ☐ Specialized power is needed at each welding booth.
- ☐ Specialized power is needed at each piece of equipment.
- ☐ Specialized power is needed around the fabrication lab.
- ☐ Consider specialized power to the classroom if demonstrations are used.
- ☐ Power supply is needed to the overhead doors.
- ☐ 220 volt outlets are needed for mobile equipment for both inside and outside. 430 volt, three-phase outlets are also needed.
- ☐ Single and triple phase outlets are needed around the fabrication lab.
- ☐ Electrical supply outlets need to be sufficient to meet the electrical equipment needs of the modern classroom.
- ☐ Electrical supply outlets need to be placed on each stationary wall and at the counters in each classroom. Floor outlets need to be placed in front of any movable walls.
- ☐ Electrical supply outlets need to be provided for any built-in audio-visual equipment installed in the classroom (e.g., television, VCR, electric ceiling screen, etc.) Controls for the screen should be by the light switches.

- ☐ Each classroom should have occupancy sensors installed for lights.
- ☐ Oversizing the electrical system should be considered for future growth.

Lighting:

- ☐ Task lighting is needed at each booth.
- ☐ Task lighting is needed at each work area.
- ☐ Extra bright lighting is needed for the entire lab.
- ☐ Natural light should be used where practical.
- ☐ 140 foot candles are the recommendation for lighting in this area.
- ☐ Lighting needs to be even across the classroom.
- ☐ Bi-level lighting will accommodate an instructor's need to vary the light intensity for different instructional tasks.
- ☐ The light fixtures need to be energy efficient T-8s with an electronic ballast to keep operating costs at a minimum. The lamps should have a CRI of .85.

Technology:

- ☐ Data drops should be located in the following areas:
 - Classroom (4-6 drops)
 - Info system (4 drops)
 - CNC (1 drop)
 - Office (1 drop)
 - Lecture and screen area (1 drop)
- ☐ Consider an observation system.
- ☐ Telephones should be located in the classroom, office and lab.

- ☐ Each classroom needs to have access to cable TV for commercial, satellite and closed circuit broadcasts over the cable.
- ☐ Telephone jacks should be placed near the door to the classroom and near the teacher's area.
- ☐ The telephone system should be programmed to enable outgoing calls directly from the classroom. All incoming calls should go through the main office switchboard.
- ☐ Each classroom should be equipped with an integrated clock, intercom, and bell system.
- ☐ Each classroom should be equipped with a TV, VCR, electric screen and overhead/LCD projector. In those classrooms that have moveable walls, the TV/VCR needs to be placed away from the moveable wall for noise separation.
- ☐ The area should be wired with data cable to enable the connection of a local area network and a wide area network

SURFACES

Floors:

- ☐ Vinyl composition tile should be used in the classroom, office and storage room.
- ☐ Bare, non-painted concrete should be installed in the lab area.
- ☐ Consider a floor platen in the middle of the fabrication lab and below the overhead crane. (Consider using a matrix 2' apart.)
- ☐ Floor should have safety striping in zoned areas.

Walls:

- ☐ Durable, light colored, flat painted wall surfaces are needed to reduce glare.
- ☐ Masonry walls are preferred and possibly *Wonderboard* could be used.
- ☐ Some tackable walls surface is needed in the classroom and lab.
- ☐ White boards with friction clips are needed in the classroom.
- ☐ Windows should be used where applicable.
- ☐ Internal windows in the office are needed to supervise the lab and classrooms.
- ☐ Windows need to be of double pane glass and have operable integral blinds where practical.

Ceilings:

- ☐ Acoustical, dropped ceiling tile is needed in the classroom and office.
- ☐ The lab area ceiling should be 14' high.

Doors:

- ☐ All passage doors should have a window.
- ☐ The overhead door in the lab should be 14'x14'. A remote control door opener should be considered.
- ☐ Oversized double doors are needed for metal storage.

STORAGE

- ☐ Adjustable shelves in the cabinet storage are needed.
- ☐ Heavy duty shelving is needed for the metal storage. (Pallet racks)
- ☐ Shelving and cabinet storage is needed in the information area.
- ☐ Cylinder storage is needed outside. (10'x10') This should be open storage.

- ☐ Each classroom needs to have at least 24' of base cabinets for storage.
- ☐ The base cabinets should have counter tops and should have knee spaces underneath to act as desks for computer stations.
- ☐ Each classroom needs to have overhead wall cabinets above the base cabinets.
- ☐ Each classroom needs to have sufficient storage for those specialized books, magazines, and other instructional materials necessary for successful instruction.
- ☐ Each classroom needs to have some of the storage cabinets be secured specifically for the personal effects of the instructors.
- ☐ Space is needed for two (2) four-drawer, letter-size file cabinets.

FURNITURE AND EQUIPMENT

- ☐ Portable viewing curtains
- ☐ Workbenches are needed in the lab area at each bay.
- ☐ Mobile work rack
- ☐ Paint storage rack
- ☐ Air compressor
- ☐ Exhaust Fans
- ☐ Consider Overhead Crane

- ☐ Sufficient desks, tables, and chairs to meet the needs of the instructional program.
- ☐ TV, VCR, overhead/LCD projector, and electric ceiling mounted screen.

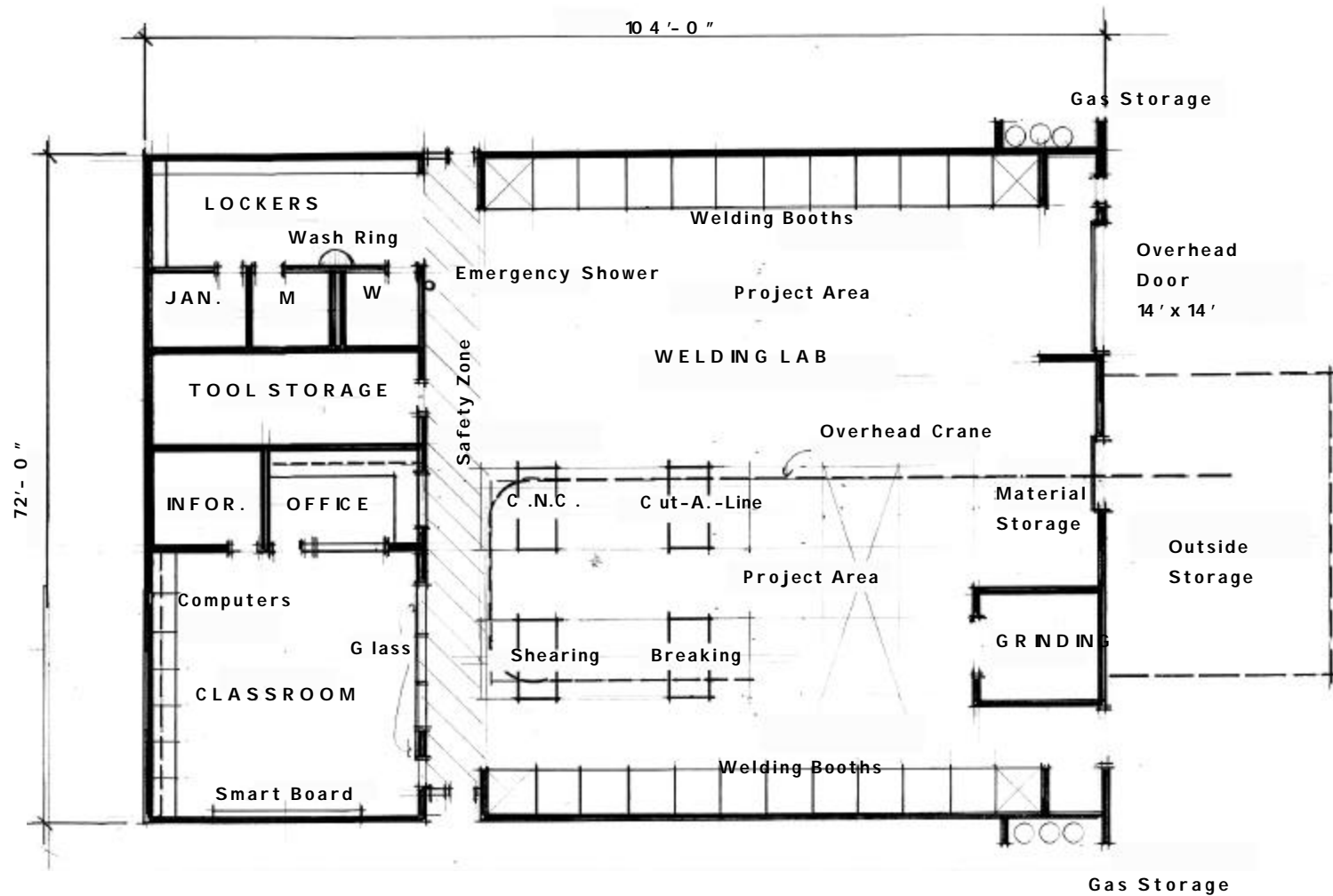
SAFETY ISSUES:

- ☐ Safety viewing curtains in front of the welding booth.
- ☐ All furniture should be ergonomically correct.

IMPORTANT NOTE

The following graphics are intended to show typical spaces and spacial relationships. They are not intended to serve as architectural drawings and are not adapted to specific sites.

These graphics should be used as a starting place for discussions with district personnel, planners, architects and engineers. Almost certainly, changes and adaptations will be required to meet the particular needs of the educational institution and the programs they offer.



WELDING & FABRICATION

The Matrix Group

Not to Scale